

- (a) forming a silicon oxynitride film on a silicon substrate;
- (b) performing a heat treatment while keeping a surface of the silicon oxynitride film in contact with a gas containing nitrogen and oxygen to introduce at least nitrogen into the silicon oxynitride film;
- (c) after step (b), forming a semiconductor film containing an impurity of first conductivity type on the silicon oxynitride film;
- (d) after step (c), forming a protecting film for the gate on the semiconductor film;
- (~~d~~e) after step (~~e~~d), forming a protecting layer on the gate composed of the protecting film for the gate and a gate electrode composed of the semiconductor film by patterning the protecting film for the gate and the semiconductor film;
- (f) forming a first side wall with a L-shape cross sectional view on the sides of the gate electrode and the protecting layer on the gate, and a second side wall that spreads over the side and the base of the first side wall;
- (~~e~~g) after step (~~d~~f), forming a gate insulating film composed of the silicon oxynitride film by patterning the silicon oxynitride film,

wherein the gate insulating film has a nitrogen concentration peak formed at around the center portion of the silicon oxynitride film.

2. (Previously Amended) The method of claim 1, wherein the silicon oxynitride film is formed by concurrently applying an N₂O gas and performing a heat treatment to the surface of the silicon substrate in step (a).

3. (Original) The method of claim 1, wherein the step (c) includes the substeps of:

forming, as the semiconductor film an amorphous silicon film on the silicon oxynitride film;

implanting impurity ions into the amorphous silicon film; and

performing a heat treatment for activating the impurity to change the amorphous film into a polysilicon film.

4. (Original) The method of claim 1, wherein the heat treatment is performed at 800 to 1050 °C in the step (b).

5. (Cancelled)

6. (Original) The method of claim 5, wherein an NO gas is used as the gas containing nitrogen in the step (b).

7. (Original) The method of claim 5, wherein the N₂O gas is used as the gas containing nitrogen in the step (b).

8. (Previously Amended) The method of any one of claims 1 to 7, wherein the semiconductor device is a p-channel MIS transistor and a silicon film for a gate electrode containing boron is formed as the semiconductor film in step (c).

9. (Cancelled)

10. (Cancelled)